

### Joint Evolution of $\Omega_x$ and $\Omega_y$ During a Time Period $t$

$$\cos(\Omega_x t) \cos(\Omega_y t) = \cos[(\Omega_x + \Omega_y) t] + \cos[(\Omega_x - \Omega_y) t] \quad \text{Data Set (1)}$$

$$\cos(\Omega_x t) \sin(\Omega_y t) = \sin[(\Omega_x + \Omega_y) t] - \sin[(\Omega_x - \Omega_y) t] \quad \text{Data Set (2)}$$

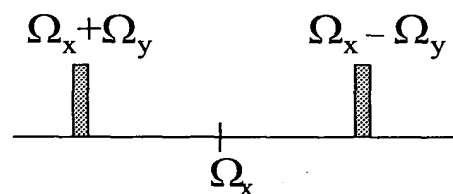
$$\sin(\Omega_x t) \cos(\Omega_y t) = \sin[(\Omega_x + \Omega_y) t] + \sin[(\Omega_x - \Omega_y) t] \quad \text{Data Set (3)}$$

$$\sin(\Omega_x t) \sin(\Omega_y t) = -\cos[(\Omega_x + \Omega_y) t] + \cos[(\Omega_x - \Omega_y) t] \quad \text{Data Set (4)}$$

- (A) Quadrature detection of peaks forming the in-phase peak pair in cosine-modulated RD NMR

$$\cos[(\Omega_x + \Omega_y) t] + \cos[(\Omega_x - \Omega_y) t] \quad (1)$$

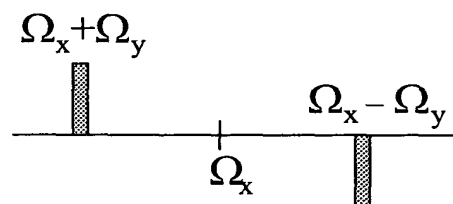
$$\sin[(\Omega_x + \Omega_y) t] + \sin[(\Omega_x - \Omega_y) t] \quad (3)$$



- (B) Quadrature detection of peaks forming the anti-phase peak pair in sine-modulated RD NMR

$$\cos[(\Omega_x + \Omega_y) t] - \cos[(\Omega_x - \Omega_y) t] \quad - (4)$$

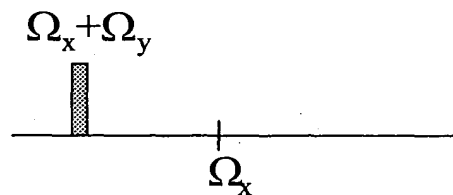
$$\sin[(\Omega_x + \Omega_y) t] - \sin[(\Omega_x - \Omega_y) t] \quad (2)$$



- (C) Edited, phase sensitive detection of the peak encoding the sum of the two chemical shifts,  $\Omega_x + \Omega_y$

$$\cos[(\Omega_x + \Omega_y) t] \quad (1) - (4)$$

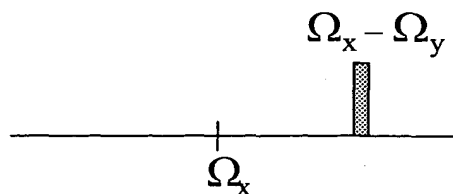
$$\sin[(\Omega_x + \Omega_y) t] \quad (3) + (2)$$



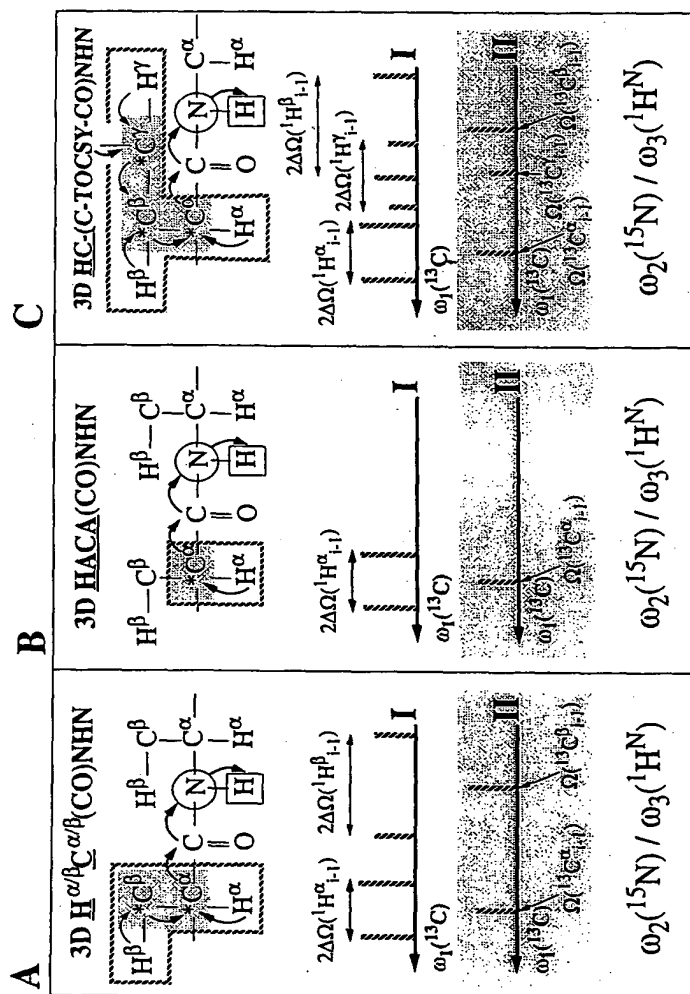
- (D) Edited, phase sensitive detection of the peak encoding the difference of the two chemical shifts,  $\Omega_x - \Omega_y$

$$\cos[(\Omega_x - \Omega_y) t] \quad (1) + (4)$$

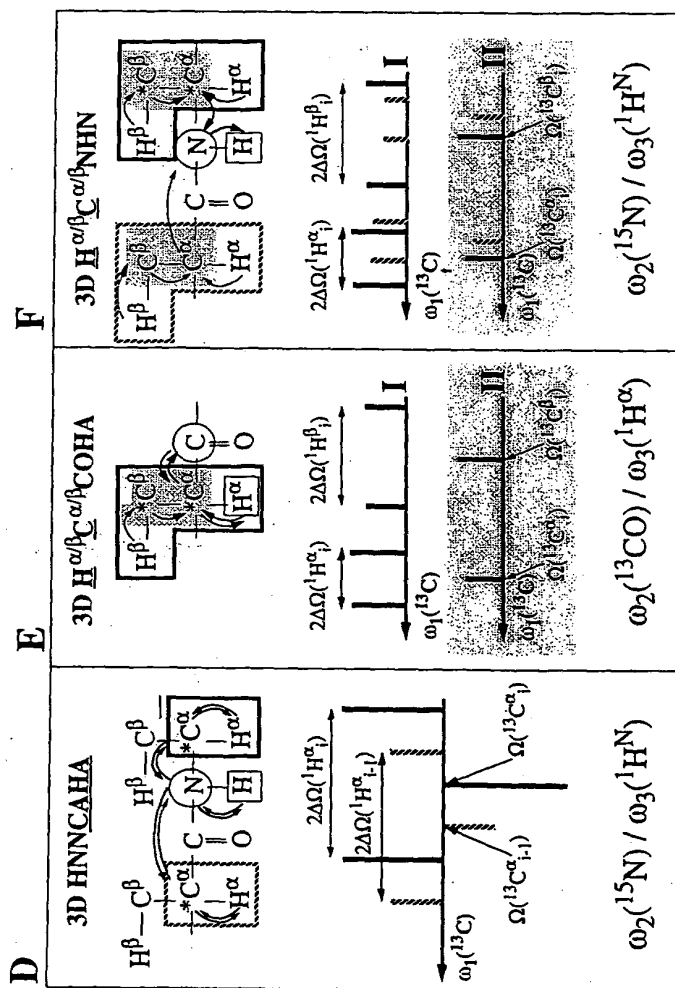
$$\sin[(\Omega_x - \Omega_y) t] \quad (3) - (2)$$



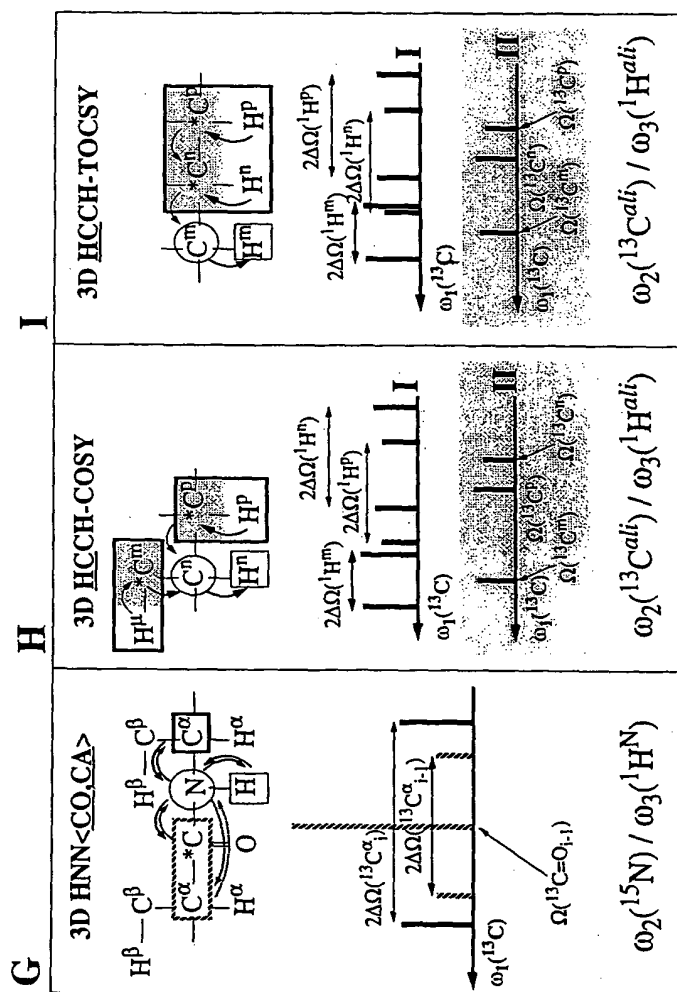
**FIGURE 1**



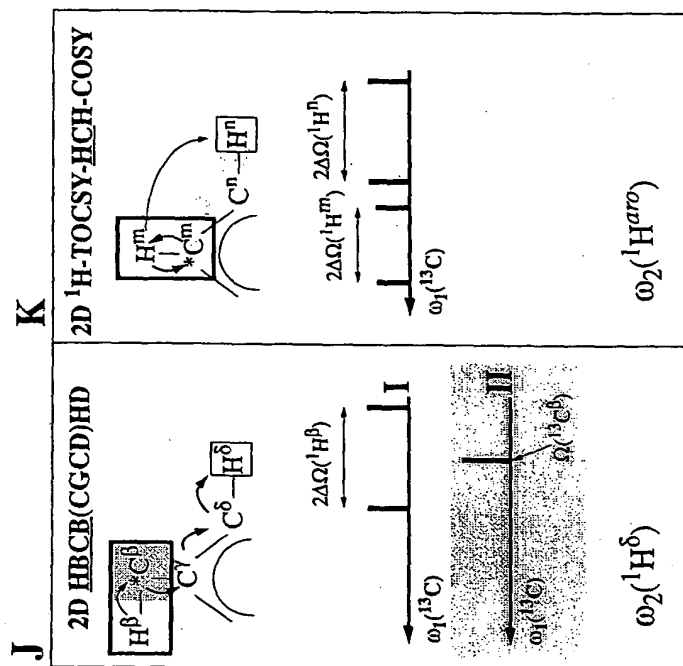
FIGURES 2A-C



FIGURES 2D-F



FIGURES 2G-I



FIGURES 2J-K

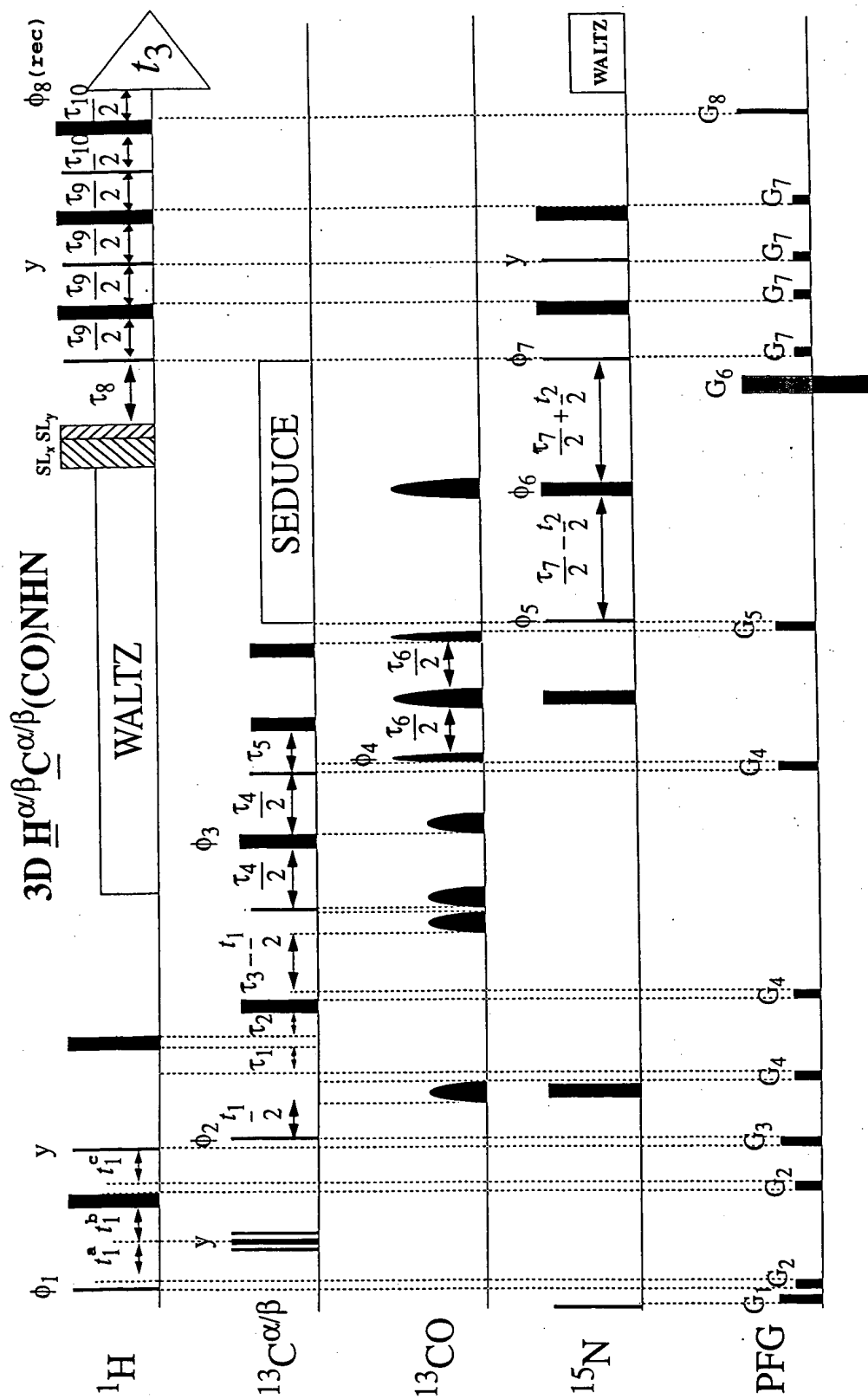
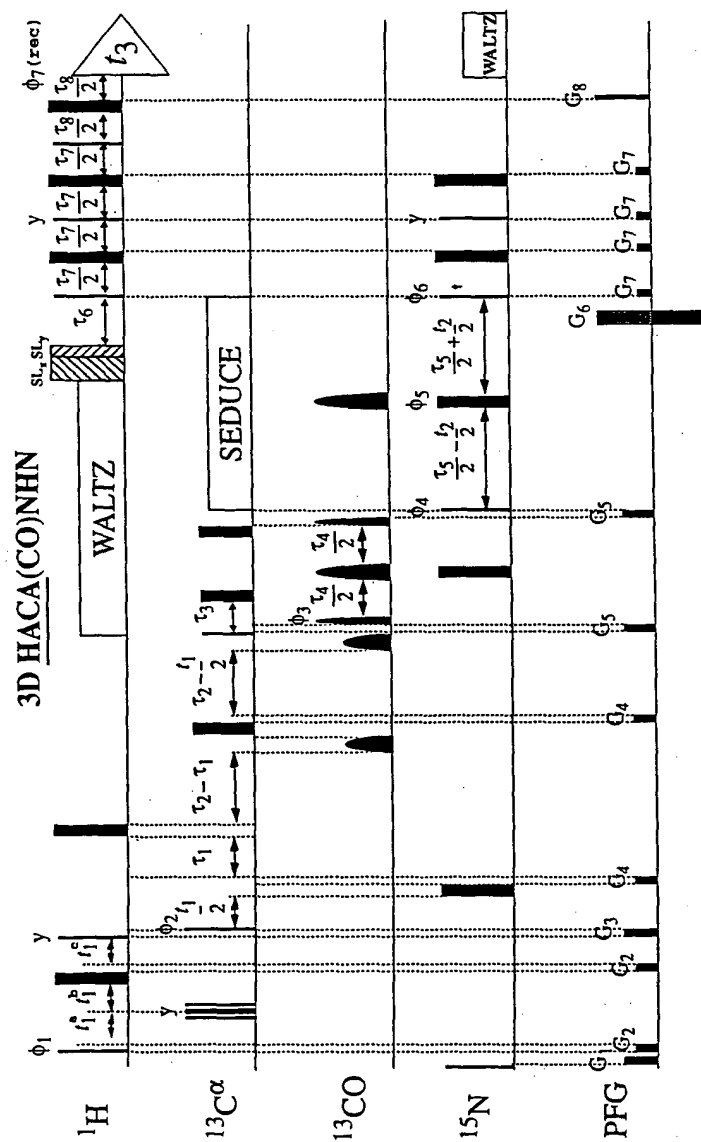


FIGURE 3A



**FIGURE 3B**





**FIGURE 3D**

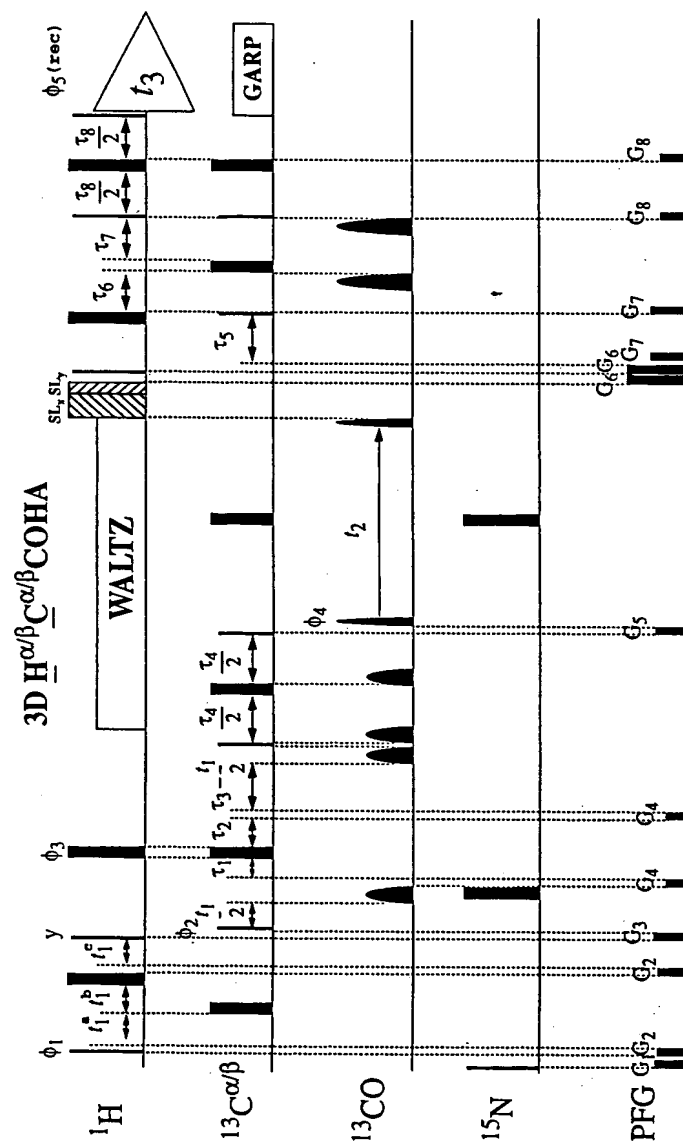
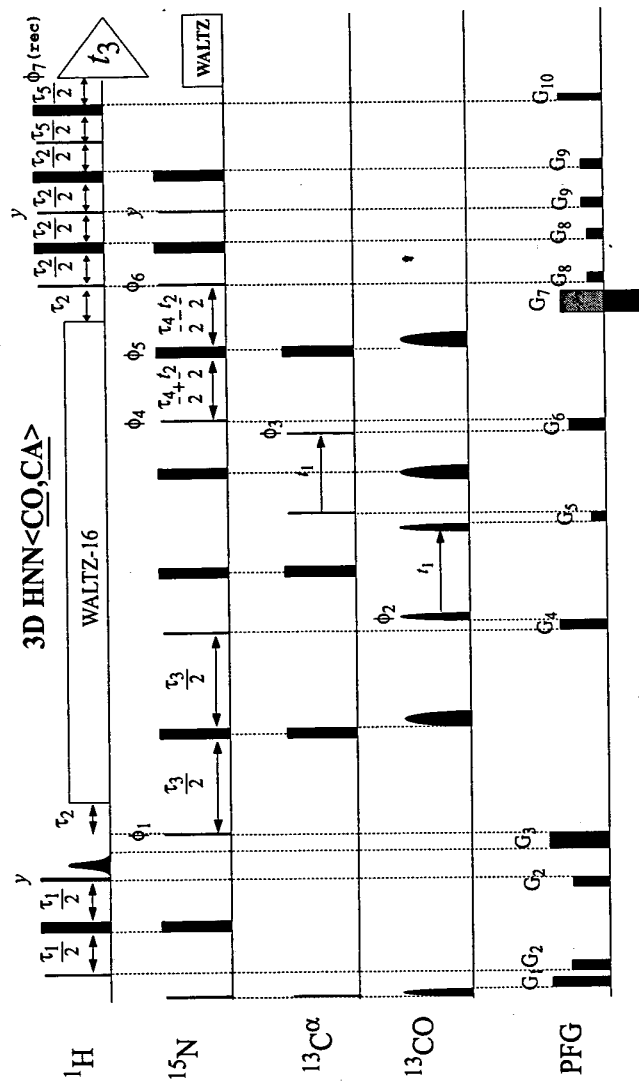


FIGURE 3E





**FIGURE 3G**



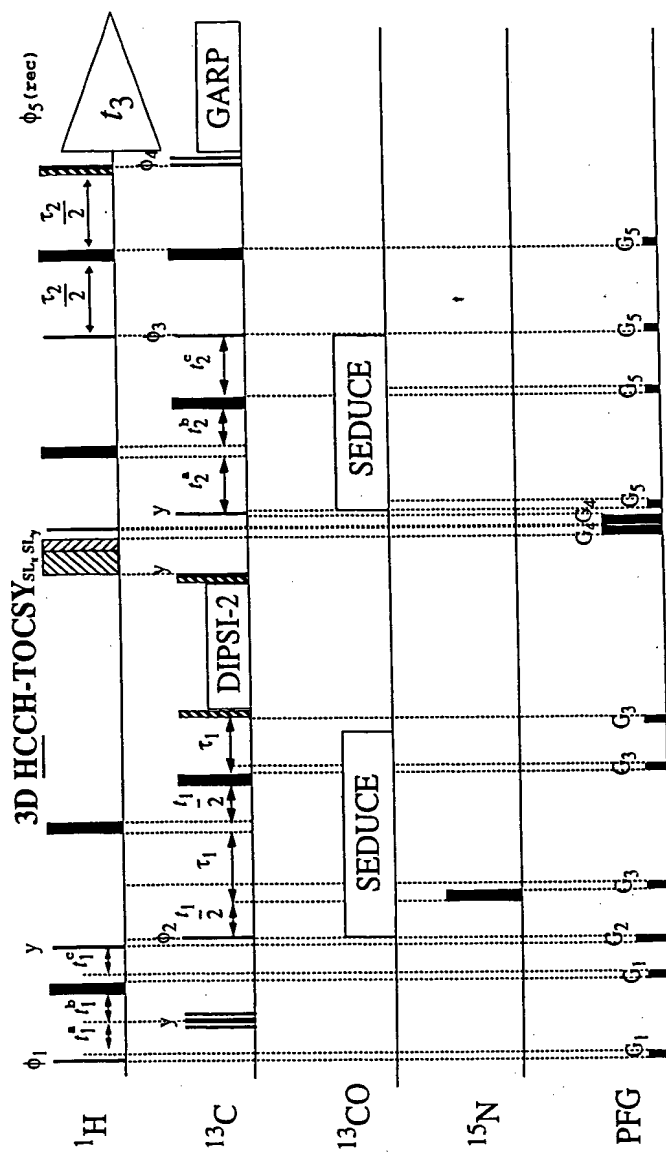


FIGURE 3I

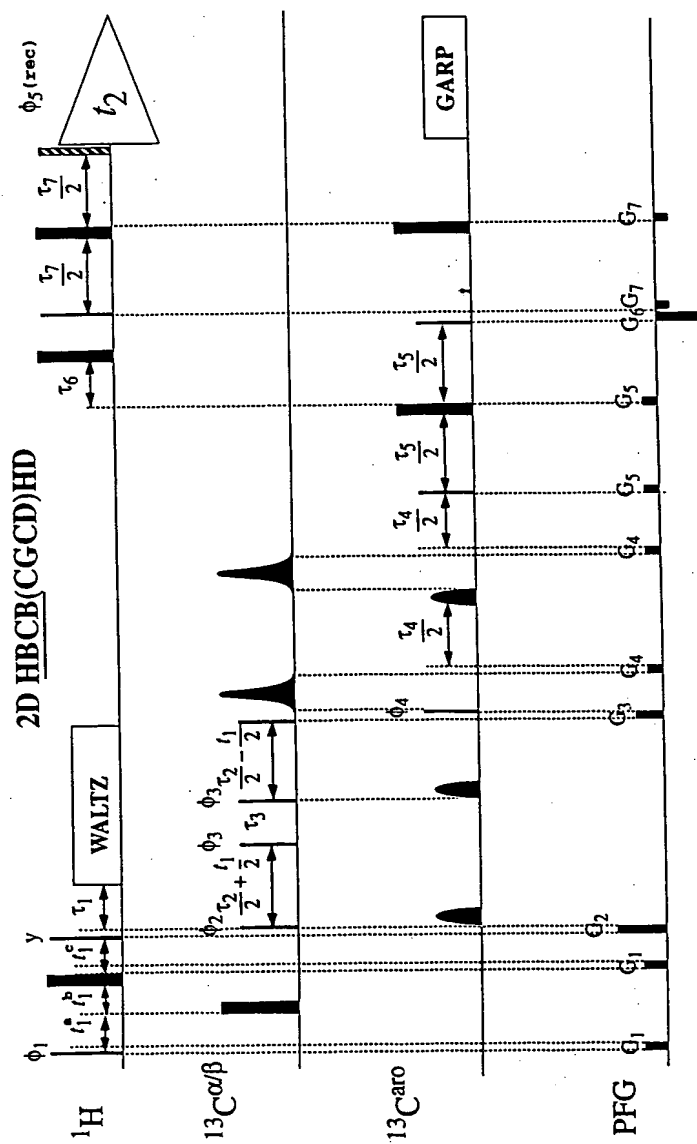


FIGURE 3J

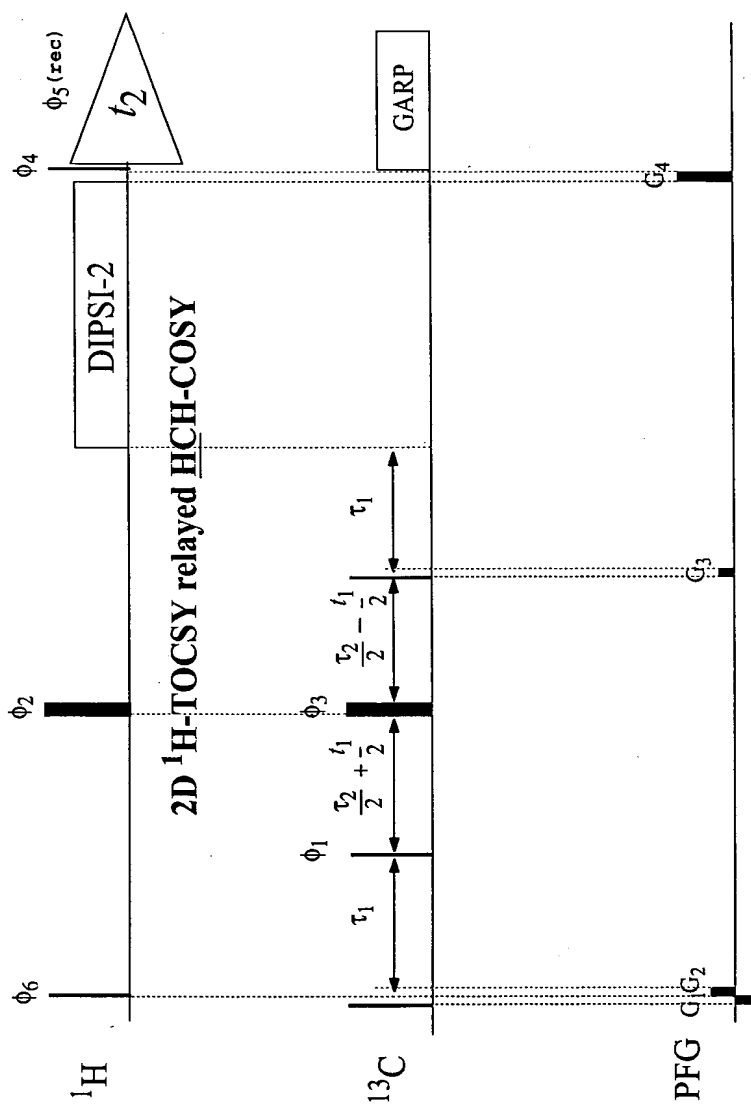


FIGURE 3K



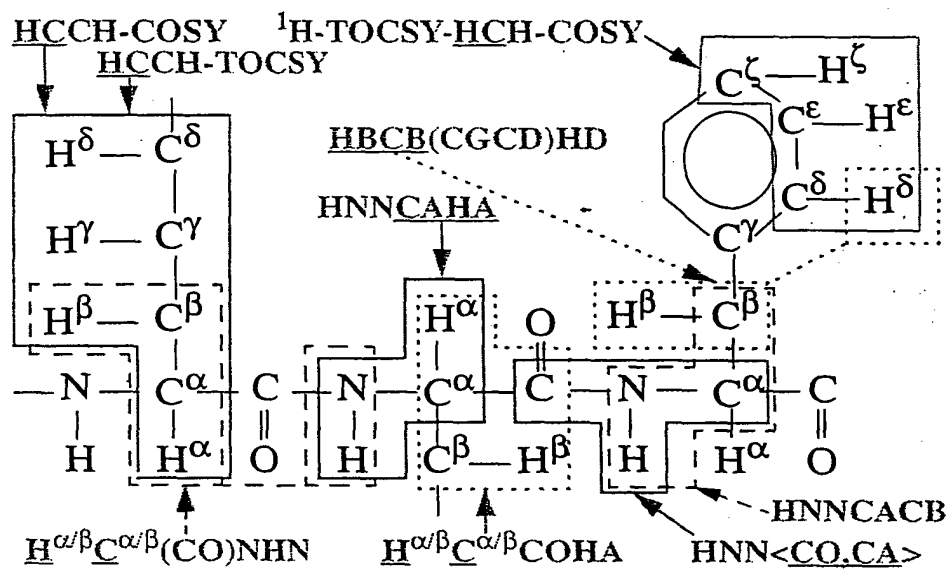


FIGURE 4

3D HACA(CO)NHN

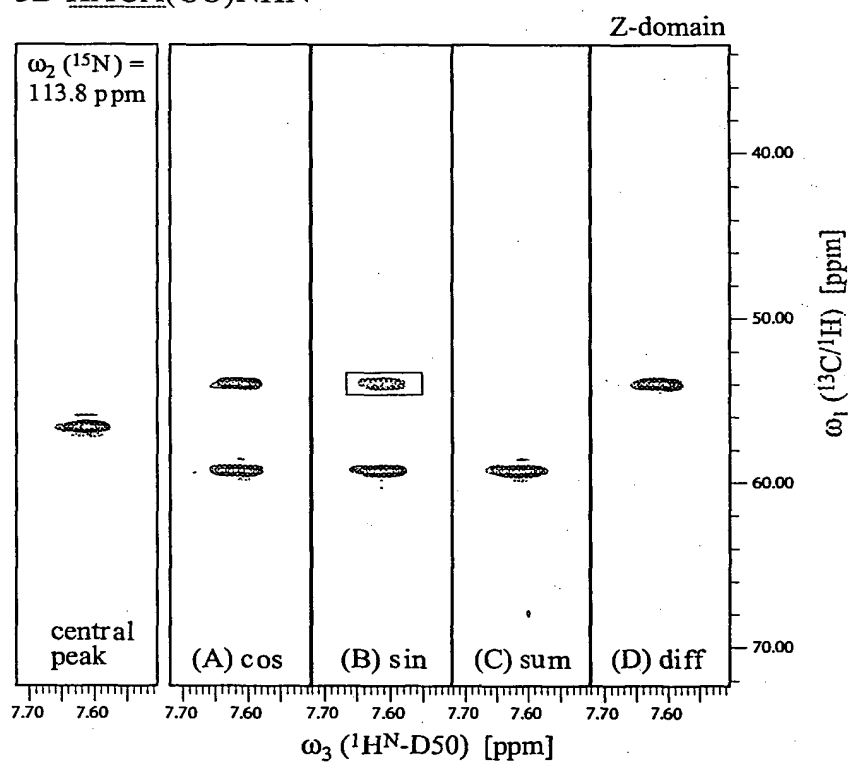


FIGURE 5

### 3D HNNCAHA

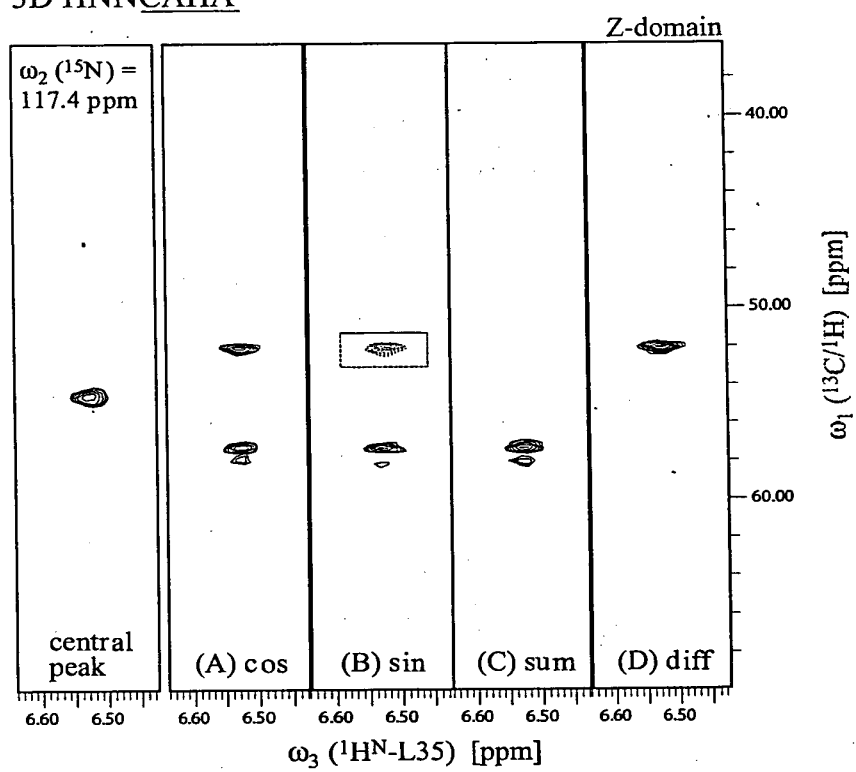


FIGURE 6

3D  $\underline{H}\alpha/\beta\underline{C}\alpha/\beta(\underline{CO})\underline{NHN}$

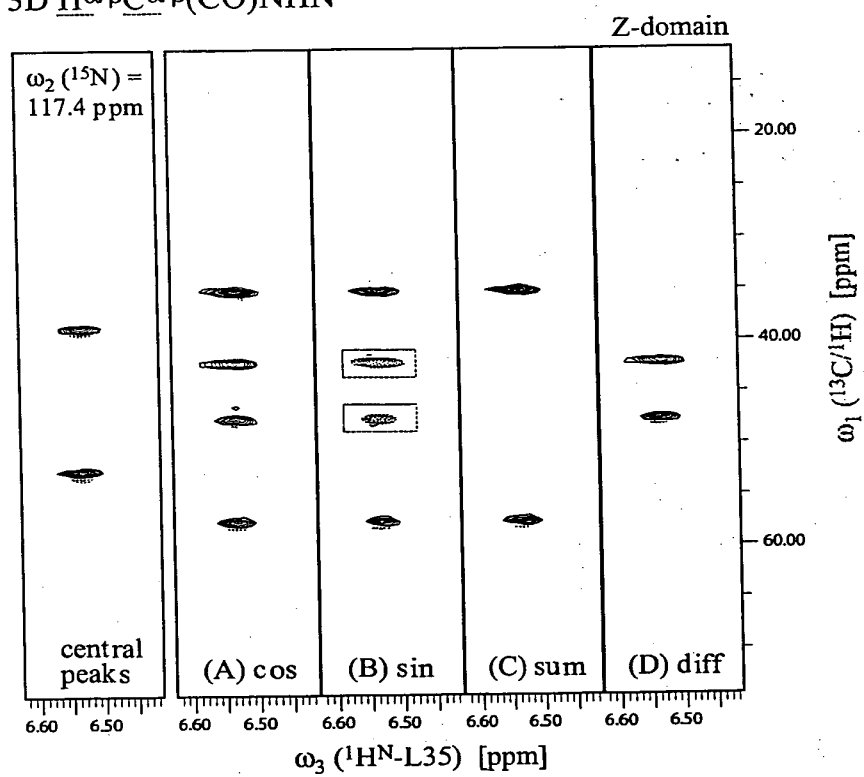


FIGURE 7

3D  $\underline{H}\alpha\beta\underline{C}\alpha\beta\underline{NHN}$

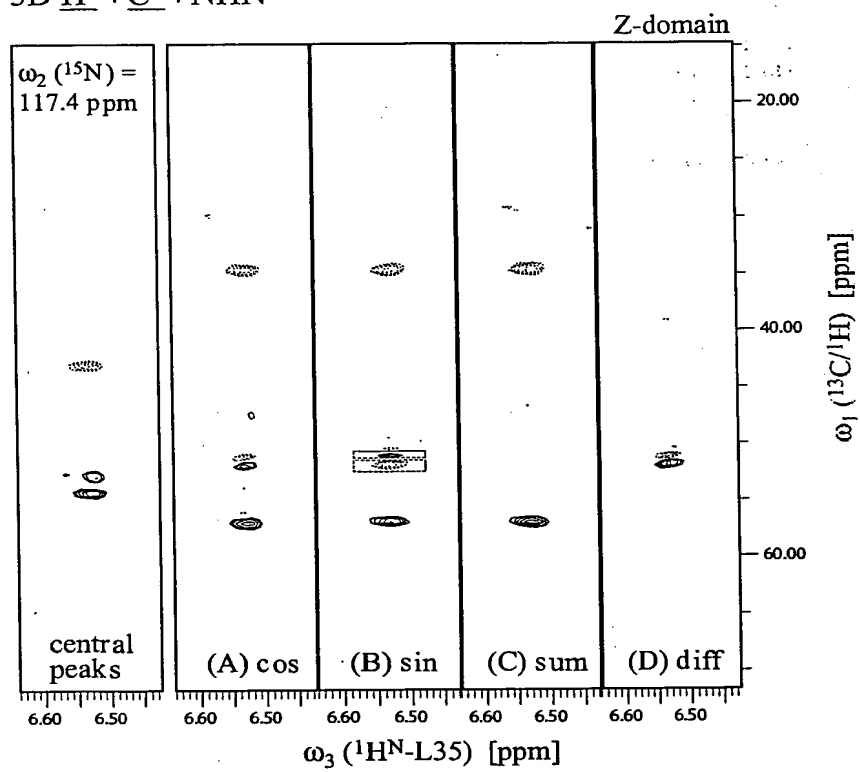


FIGURE 8

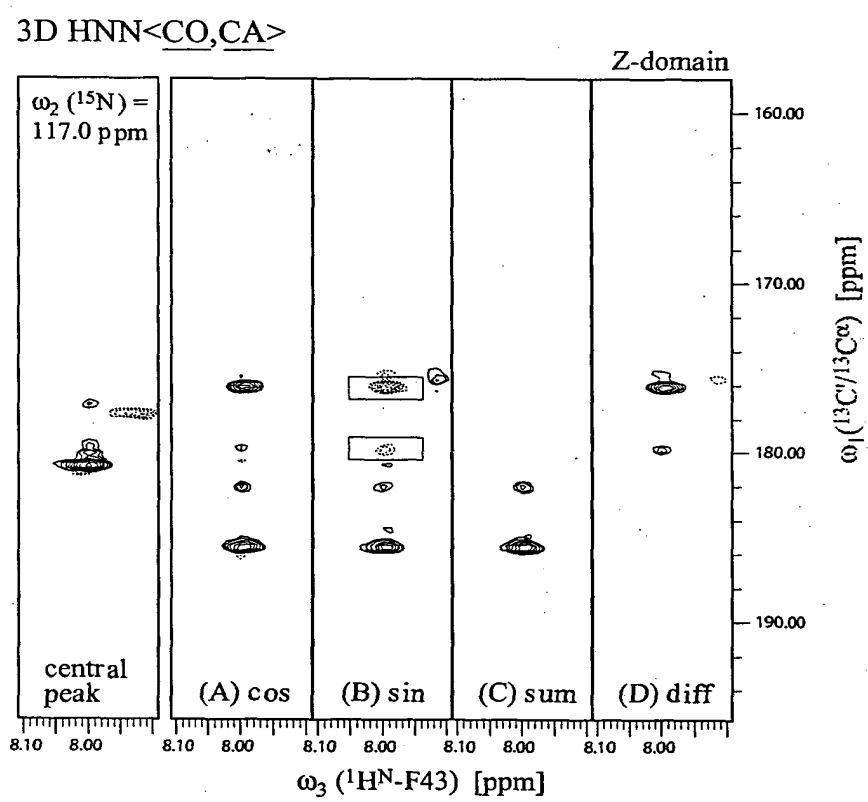


FIGURE 9

3D  $\underline{\text{HC}}(\text{C-TOCSY-CO})\text{NHN}$

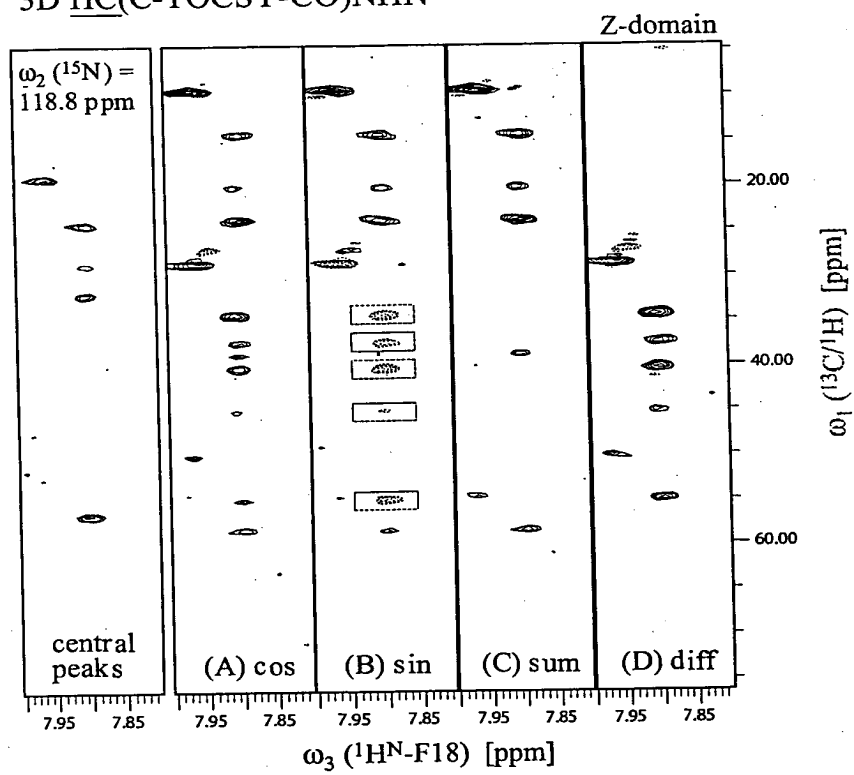
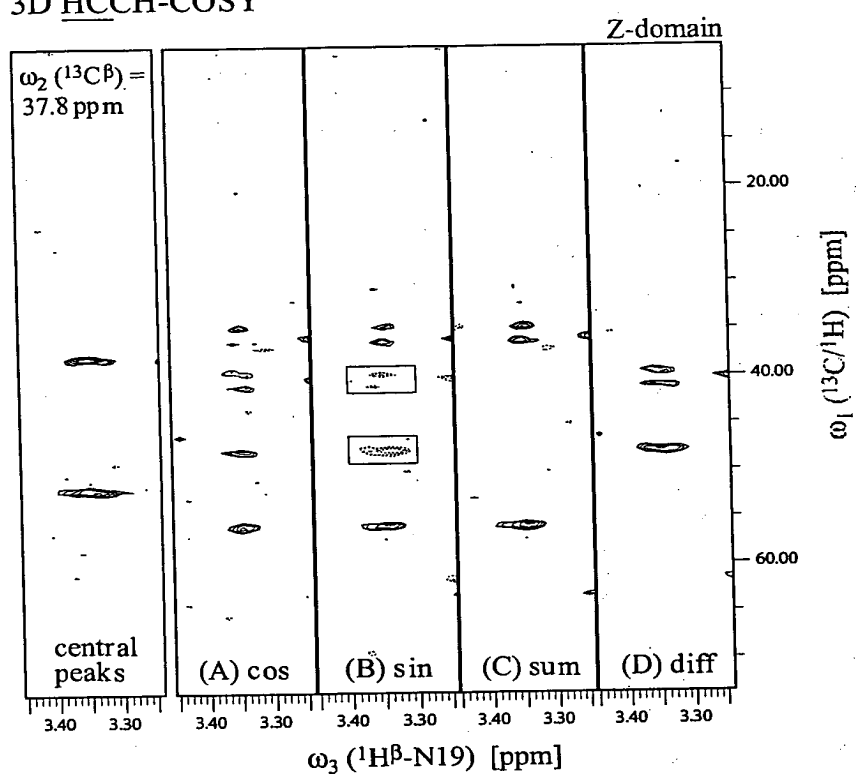


FIGURE 10

# 3D HCCH-COSY



**FIGURE 11**



# 3D HCCH-TOCSY

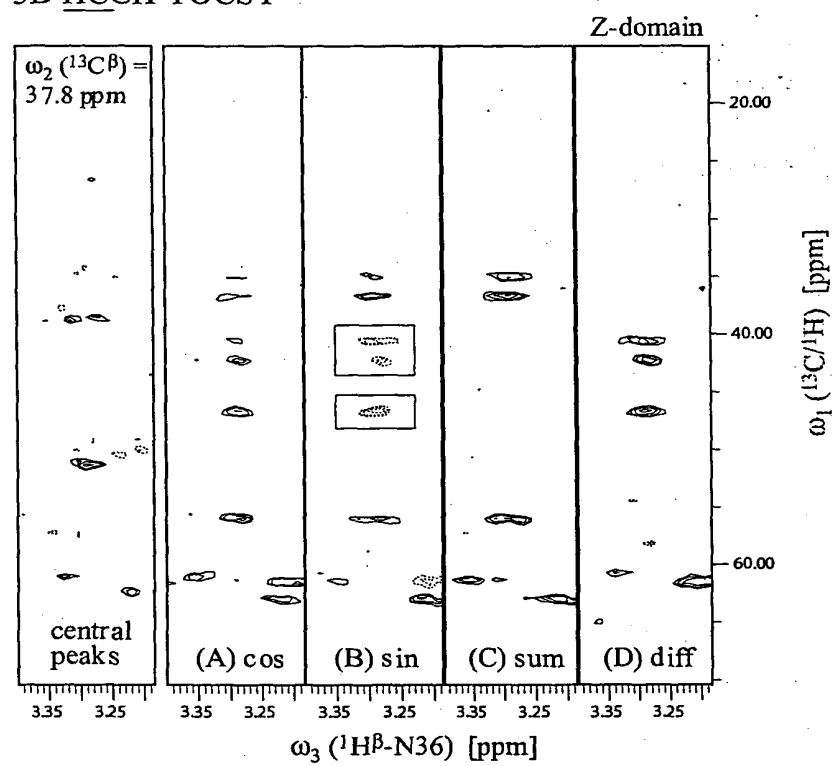
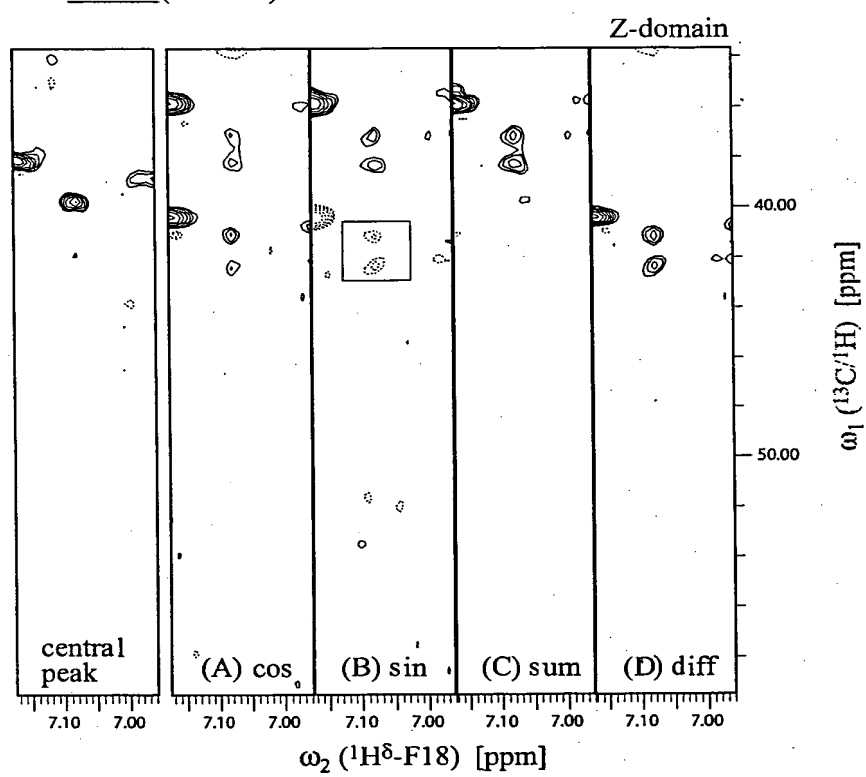


FIGURE 12

2D HBCB(CGCD)HD



**FIGURE 13**

3D  $\underline{H\alpha\beta C\alpha\beta COHA}$

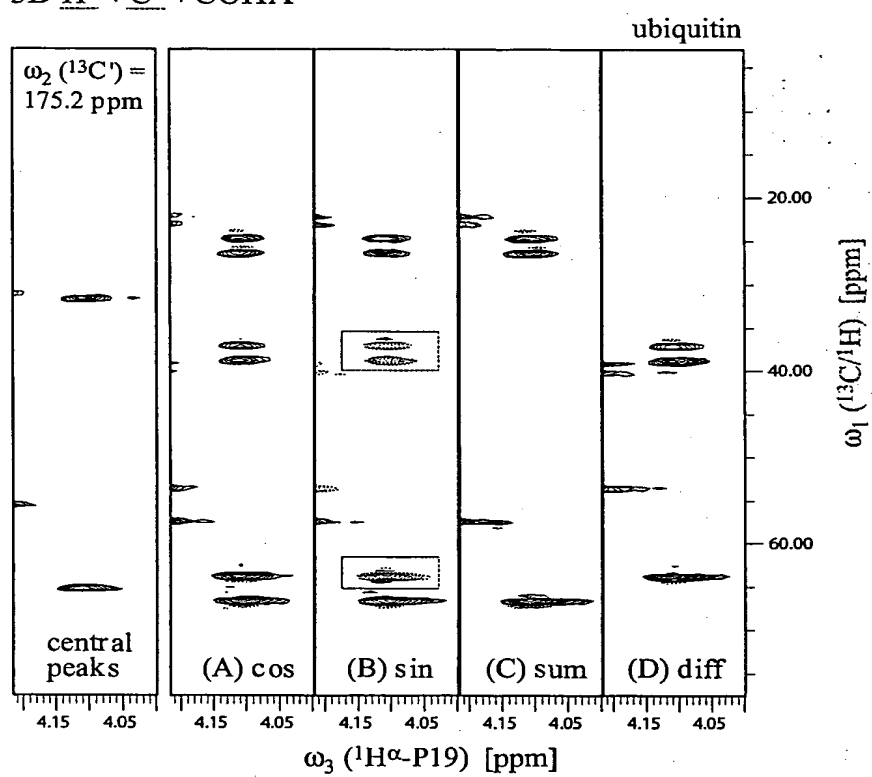


FIGURE 14

# 2D H-TOCSY-HCH-COSY

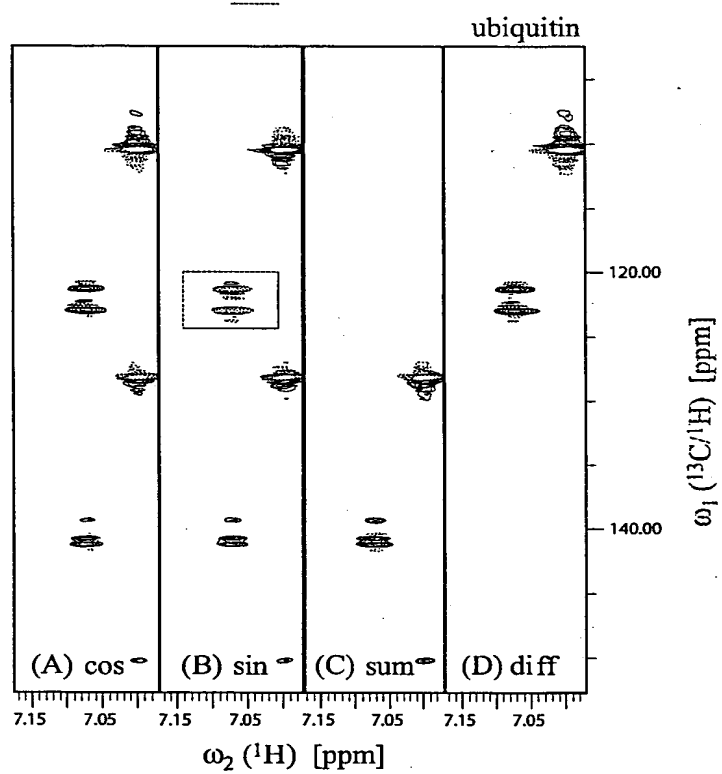


FIGURE 15